



U.S. NUCLEAR REGULATORY COMMISSION

STANDARD REVIEW PLAN

OFFICE OF NUCLEAR REACTOR REGULATION

2.2.3 EVALUATION OF POTENTIAL ACCIDENTS

REVIEW RESPONSIBILITIES

Primary - ~~Siting Analysis Branch (SAB)~~ Probabilistic Safety Assessment Branch (SPSB)

Secondary - None

I. AREAS OF REVIEW

For an early site permit application, the ~~The applicant's~~ identification of potential accident situations on site and in the vicinity of the ~~site plant~~ is reviewed to determine ~~the~~ its completeness ~~of and~~ as well as the bases upon which these potential accidents may need to be considered in the design of a nuclear power plant or plants of specified type that might be constructed on the proposed site ~~were or were not accommodated in the design.~~ (See Standard Review Plan Sections 2.2.1 and 2.2.2.)

With respect to potential ~~offsite~~ accidents ~~on or in the vicinity of the site~~ which could affect control room habitability (e.g., toxic gases, asphyxiants), those accidents which are to be

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~~Published standard review plans will be revised periodically, as appropriate, to accommodate comments and to reflect new information and experience.~~

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accommodated on a design basis, as determined within SRP Section 2.2.3 review, will need to be addressed by the Accident Evaluation Branch (AEB) within the design of the nuclear power plant or plants of specified type that might be constructed on the proposed site and reviewed at the combined license (COL) stage (if the information is not available at the early site permit stage) using SRP Section 6.4. review, in accordance with TMI-Related Requirement III.D.3.4 of NUREG-0694.

The applicant's probability analyses of potential accidents involving hazardous materials or activities on site and in the vicinity of a nuclear power plant or plants of specified type that might be constructed on the proposed site the plant, if such analyses have been performed, are also reviewed by the Applied Statistics Branch (ASB/MPA) on request by SAB to determine that appropriate data and analytical models have been utilized.

The analyses of the consequences of accidents involving nearby industrial, military, and transportation facilities which have been identified as design basis events are reviewed to determine if any of them need to be identified as design basis events.

II. ACCEPTANCE CRITERIA

SAB SPSB acceptance criteria are based on meeting the relevant requirements of 10 CFR 52.17 and 10 CFR Part 100, §100.1020, (Ref. 1) as it relates they relate to the factors to be considered in the evaluation of sites. , which indicates These requirements stipulate that reactors should reflect through their design, construction, and operation an extremely low probability for accidents that could result in the release of significant quantities of radioactive fission products. In addition, 10 CFR Part 100, §100.10, indicates that the site location, in conjunction with other considerations, should insure a low risk

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~~of public exposure~~ individual and societal risk of potential plant accidents must be low.

Specific criteria necessary to meet the relevant requirements of 10 CFR ~~Part 100, §100.1020~~ are described in the following paragraphs.

Offsite and onsite hazards which have the potential for causing onsite accidents leading to the release of significant quantities of radioactive fission products, and thus pose an undue risk of public exposure, should have a sufficiently low probability of occurrence and be within the scope of the low probability of occurrence criterion of 10 CFR ~~Part 100, §100.1020~~. Specific guidance with respect to offsite hazards is provided in Chapter 2, Section 2.2.3, of Regulatory Guide (RG) 1.70 (Ref. 2). As indicated therein, the identification of design basis events resulting from the presence of hazardous materials or activities on site and in the vicinity of a nuclear power plant or plants of specified type that might be constructed on the proposed site the plant is acceptable if the design basis events include each postulated type of accident for which the expected rate of occurrence of potential exposures in excess of the 10 CFR Part 100 guidelines is estimated to exceed the NRC staff objective of approximately 10^{-7} per year. Because of the difficulty of assigning accurate numerical values to the expected rate of unprecedented potential hazards generally considered in this SRP section, judgment must be used as to the acceptability of the overall risk presented.

The probability of occurrence of the initiating events having the potential for causing leading to potential consequences in excess of 10 CFR Part 100 exposure guidelines should be estimated using assumptions that are as representative of the specific site as is practicable. In the absence of a specific plant design, past review experience of existing plants and judgment should be factored into the determination of the need for identifying a site hazard as a design basis event. In addition, because of the low probabilities of the events under consideration, data are often not available to permit accurate calculation of probabilities. Accordingly, the expected rate of occurrence of an initiating event potential exposures in excess of the 10 CFR Part 100 guidelines of approximately 10^{-6} per year is acceptable if, when combined with reasonable qualitative arguments, the realistic probability can be shown to be lower.

~~The effects of design basis events have been adequately considered if analyses of the effects of those accidents on the safety-related features of the plant have been performed and measures have been taken (e.g., hardening, fire protection) to mitigate the consequences of such events.~~

III. REVIEW PROCEDURES

In some cases it may be necessary to consult with or obtain specific data from other branches, such as the **Materials and Chemical Engineering Branch (EMCB)**, the **Mechanical and Civil Engineering Branch (EMEB)**, or the **Structural Engineering Branch (SEB)** or **Auxiliary Systems Branch (ASB)** **Plant Systems Branch (SPLB)**, regarding analyses of site hazards and/or their possible effects of external events on plant structures or components of a nuclear power plant or plants of specified type that might be constructed on the proposed site.

The applicant's probability calculations are reviewed, and an independent probability analysis is performed by the staff if the potential hazard is considered significant enough to affect the licenseability of the site or is important to the identification of design basis events.

All stochastic variables that affect the occurrence or severity of the postulated event are identified and judged to be either independent or conditioned by other variables.

Probabilistic models should be tested, where possible, against all available information. If the model or any portion of it, by simple extension, can be used to predict an observable accident rate, this test should be performed.

The design parameters (e.g., overpressure) and physical phenomena (e.g., gas concentration) selected by the applicant for each design basis event are reviewed to ascertain that the values are comparable to the values used in previous analyses and found to be acceptable by the staff.

~~Each design basis event is reviewed to determine that the effects of the event on the safety features of the plant have been adequately accommodated in the design.~~

If accidents involving release of smoke, flammable or nonflammable gases, or toxic chemical bearing clouds are considered to be design basis events. **then, for a nuclear power plant or plants of specified type that might be constructed on the proposed site,** an evaluation of the effects of these accidents on control room habitability ~~should~~ **will need to** be made in **accordance with SRP SAR Section 6.4** and on the operation of diesels and other safety-related equipment in **accordance with SRP SAR Chapter 9.** If the design details necessary for this evaluation are not available at the early site permit stage, the evaluation will need to be done at the COL stage.

~~Special attention should be given to the review of standardized designs which propose criteria involving individual numerical probability criteria for individual classes of external man-made hazards. In such instances the reviewer should establish that the envelope also includes an overall criterion that limits the aggregate probability of exceeding design criteria associated with all of the identified external man-made hazards. Similarly, special attention should be given to the review of a site where several sources of a particular type of manmade hazard are identified, but none of which, individually, has a probability exceeding the acceptance criteria stated herein. The objective of this special review should be to assure that~~ **should be to estimate** the aggregate probability of an outcome. ~~that may lead to unacceptable plant damage meets the acceptance criteria of subsection II of this SRP section. (A hypothetical example is a situation where the probability of a significant shock wave overpressure greater than design overpressure is about 10^{-7} per reactor year from accidents at a nearby industrial facility, and approximately equal probabilities of exceeding design pressure from railway accidents, highway accidents, and shipping accidents. Individually each may be judged acceptably low; the aggregate probability may be judged sufficiently great that it would be identified as a design basis event additional design features are warranted.)~~

IV. EVALUATION FINDINGS

If the reviewer, after a review of the onsite and offsite hazards identified in SRP Section 2.2.1-2.2.2 and evaluated in the above SRP section, concludes that there are no identifiable design basis events, the probability of exceeding the 10 CFR Part 100 dose guidelines due to offsite hazards is within the acceptance criteria given in subsection II of this SRP section. then the staff concludes that the site is acceptable for siting a nuclear power plant or plants of specified type. If one or more design basis events are identified with respect to the site. then the site may be found to be acceptable if the design of a nuclear power plant or plants of specified type that might be constructed on the proposed site is shown to adequately accommodate their effects. such that the probability of exceeding the 10 CFR Part 100 dose guidelines is within the acceptance criteria of SRP Section 2.2.3. location insures a low risk of exposure, in compliance with 10 CFR Part 100, §100.10. A conclusion of the following type may be prepared for the Staff's Safety Evaluation Report.

~~The staff concludes that the site location is acceptable and meets the relevant requirements of 10 CFR Part 100. This conclusion is based on the following. The~~ As set forth above, the applicant has identified potential accidents related to the presence of hazardous materials or activities on site and in the site vicinity which could affect the a nuclear power plant of type specified by the applicant, and from these the applicant has selected those which should be considered as design basis events at the combined license (COL) stage. and has provided analyses of the effects of these accidents on the safety-related features of the plant. From the analyses, the applicant has demonstrated that the plant is adequately protected and can be operated with an acceptable degree of safety with regard to potential accidents which may occur as the result of the presence of hazardous materials or activities at nearby industrial, military, and transportation facilities. Therefore, the staff concludes that the site location is acceptable with regard to potential accidents that could affect a nuclear power plant or plants of specified type that might be constructed on the site and meets the relevant requirements of 10 CFR Part 52.

V. IMPLEMENTATION

The following provides guidance to applicants and licensees regarding the NRC staff's plan for using this SRP section.

This SRP section will be used by the staff when performing safety evaluations of early site permit applications submitted by applicants pursuant to 10 CFR Part 52. Except in those cases in which the applicant proposes an acceptable alternate method for complying with specified portions of the Commission's regulations, the method described herein will be used by the staff in its evaluation of conformance with Commission regulations.

VI. REFERENCES

1. 10 CFR Part 100, "Reactor Site Criteria," ~~Section 100.10.~~
2. Regulatory Guide 1.70, "Standard Format and Content of Safety Analysis Reports for Nuclear Power Plants."
3. Affidavit of Jacques B. J. Read before the Atomic Safety and Licensing Board in the matter of Skagit Nuclear Power Project, Units 1 and 2, July 15, 1976. Docket Nos. STN 50-522, 523.
4. Atomic Safety and Licensing Board, Supplemental Initial Decision in the Matter of Hope Creek Generating Station, Units 1 and 2, March 28, 1977. Docket Nos. 50-354, 355.
5. Section 2, Supplement 2 to the Floating Nuclear Plant Safety Evaluation Report, Docket No. STN 50-437, September 1976.